Building complex Arbora (434 residential units) in Montreal and Origine (13 storeys) in Quebec City

Siedlungsbau Arbora (434 Wohnungen) in Montreal und Geschossbau Origine (13 Geschosse) in Quebec City

Lotissement Arbora (434 logements) et construction multi-étages Origine (13 étages à Montréal)

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2 Building complex Arbora (434 residential units) in Montreal and Origine (13 storeys) in Quebec City | M. Oberholzer

Building complex Arbora (434 residential units) in Montreal and Origine (13 storeys) in Quebec City

1. Introduction

It seems like only yesterday that it wasn't possible to build more than a few storeys in wood. Now there is a worldwide drive to build taller and taller in wood, with Eastern Canada being no exception. Nordic Structures has been a leader in the province of Quebec, pushing the limits to make it possible to build tall with our favorite material.

In early 2013, Quebec became the second Canadian province to allow wooden buildings to be constructed up to six storeys. By mid-2015, the Government of Quebec already announced the publication of a guide that outlines the technical principles needed to be followed to design and build up to 12 storeys in wood.

All this occurred in parallel to the design and development of multiple projects, including Arbora and Origine. Arbora is impressive in sheer size and the fact that is basically in downtown Montreal, the home of steel and concrete. A simple repetitive structural concept made wood a cost-effective solution. Origine, located in Quebec's second largest city, on the other hand, stands out because it consists of 12 storeys completely built in wood on top of a concrete podium.

2. Arbora

2.1. The building(s)

When finished, the three-building (two 8-storeys, one 9-storey), 597 560 square foot project, Arbora, will have 273 condominiums, 30 townhouses and 130 rental units for a total of 434 residential units.

Figure 1: Rendering of Arbora project

2.2. Location

The building site is in Montreal's Griffintown, which currently is the home to multiple new residential projects. The city recently decided to turn what was once an industrial, vacant area close to downtown Montreal into a pleasant family-oriented neighborhood.

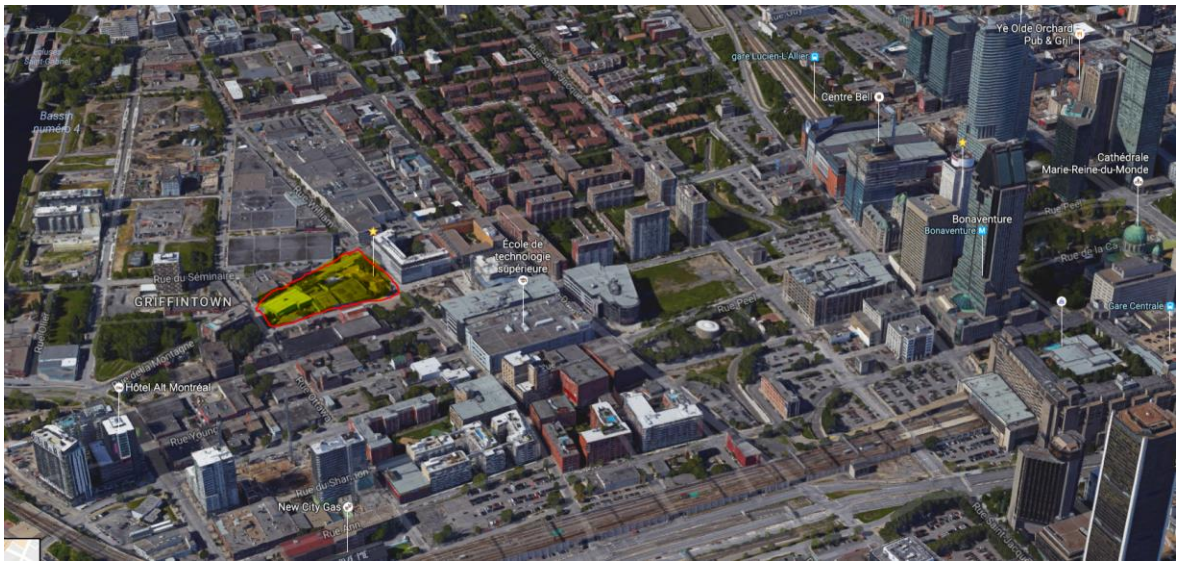

Figure 2: Overview of Arbora project location

2.3. Project group

Sotramont

LSR GESDEV

L2C LEADS 2 CONSTRUCTION

lemay

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2.4. Structural system (gravity)

The main gravity system consists of cross-laminated timber floor panels supported by a glulam post-and-beam structure. Although the three buildings are different, the typical structural system is the same.

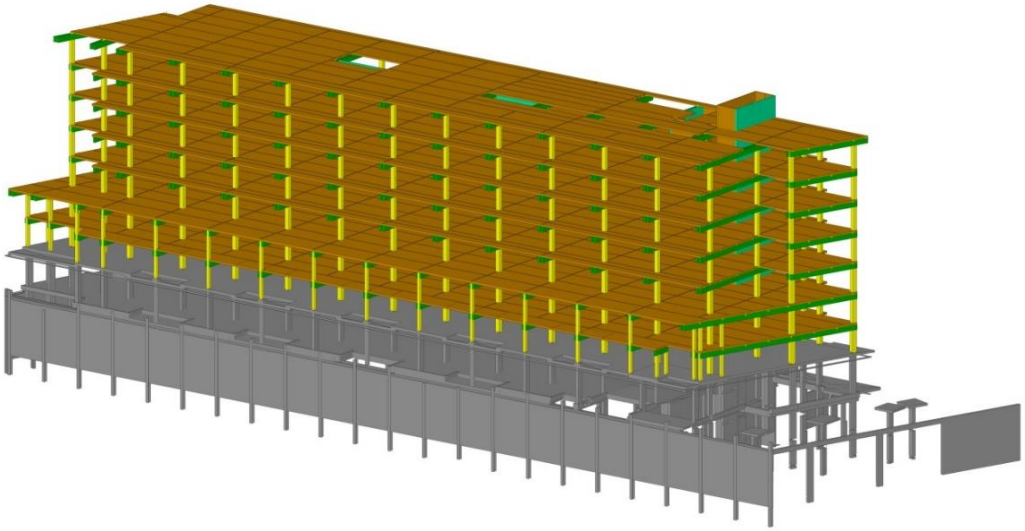

Figure 3: Structural system of building A, isometric view 1

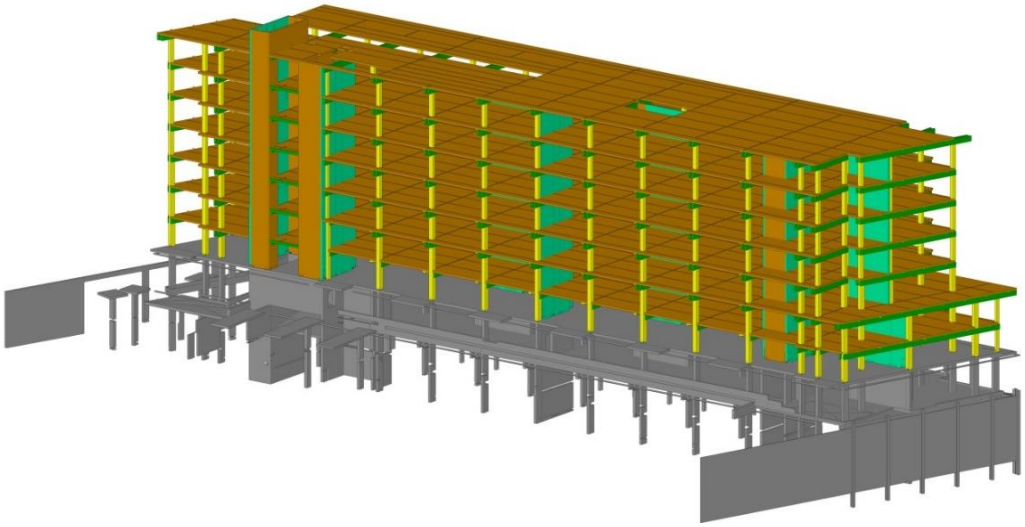

Figure 4: Structural system of building A, isometric view 2

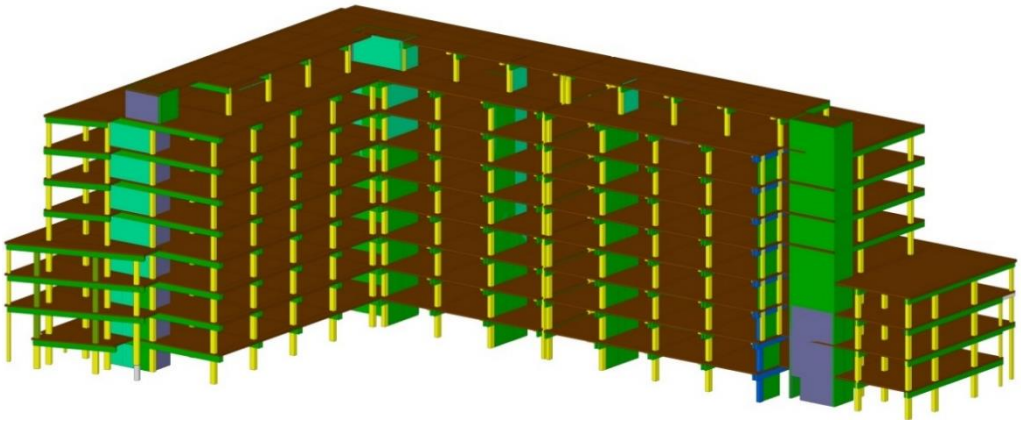

Figure 5: Structural system of building B, isometric view

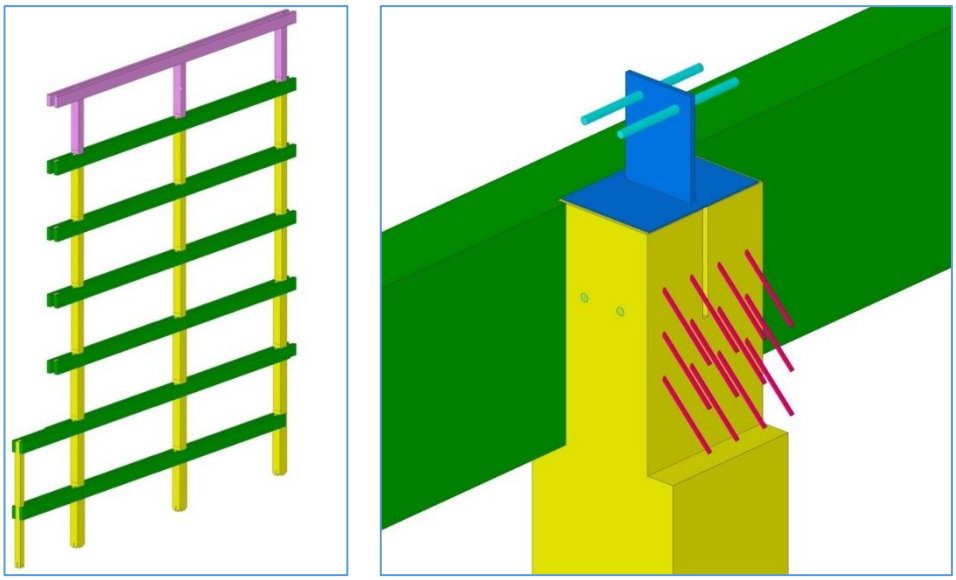

Figure 6: Typical frame (left); typical inter-storey connection (right)

2.5. Structural system (lateral)

The lateral loads are resisted with cross-laminated timber shear walls.

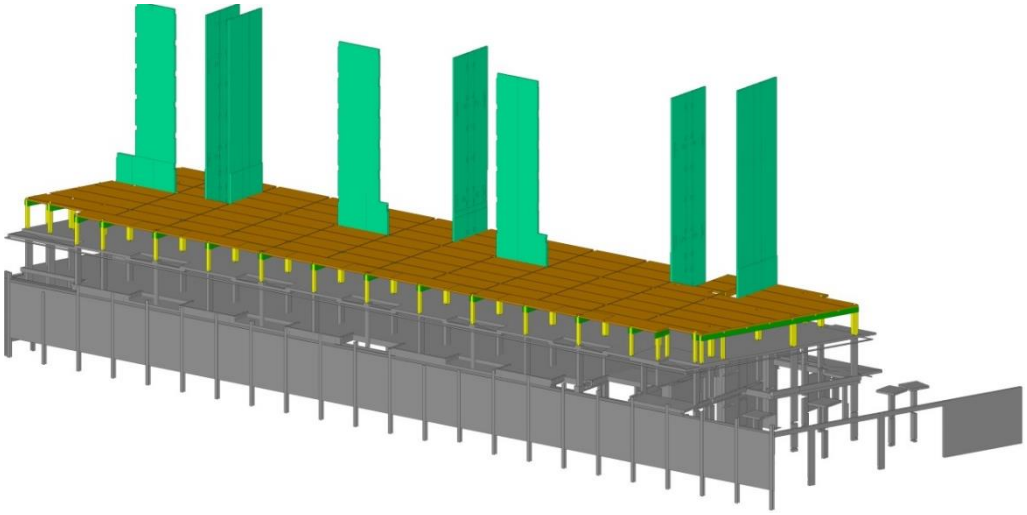

Figure 7: Lateral force resisting system (shear walls), isometric view 1

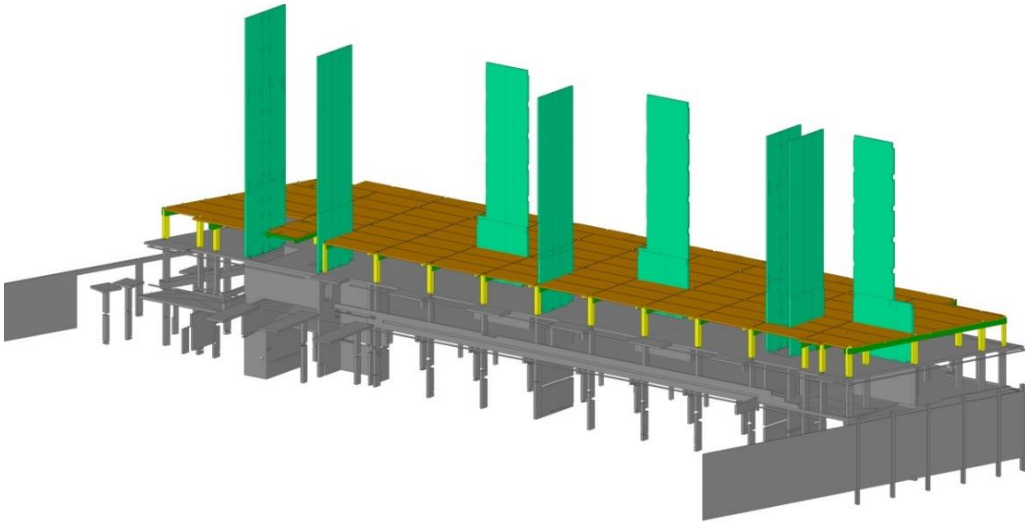

Figure 8: Lateral force resisting system (shear walls), isometric view 2

2.6. Installation

Installation of the first of three wood structures took approximately 10 weeks. Being used to other types of construction, the envelope installers could not keep up with the speed of installation of the wood skeleton.

Figure 9: Installation of Arbora, Sept. 26, 2016

Figure 10: Installation of Arbora, Oct. 5, 2016

3. Origine

3.1. The building

Origine is a major 13-storey residential project consisting of a 12-floor mass timber structure on a concrete podium and measures 40.9 meters in height. A long time in the making, the project has drawn on input from federal and provincial officials as well as research institutes, and will help pave the way for the development of a North American market for solid wood building products made in Quebec.

Figure 11: Rendering of Origine project

3.2. Location

The building is in Quebec City's Pointe-aux-Lièvres eco-district.

Figure 12: Overview of Origine project location

3.3. Project group

ebc INC
YVAN BLOUIN ARCHITECTE
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3.4. Structural system (gravity)

The main gravity system consists of cross-laminated timber floor panels supported by a glu-lam post-and-beam structure as well as balloon-framed cross-laminated timber bearing walls.

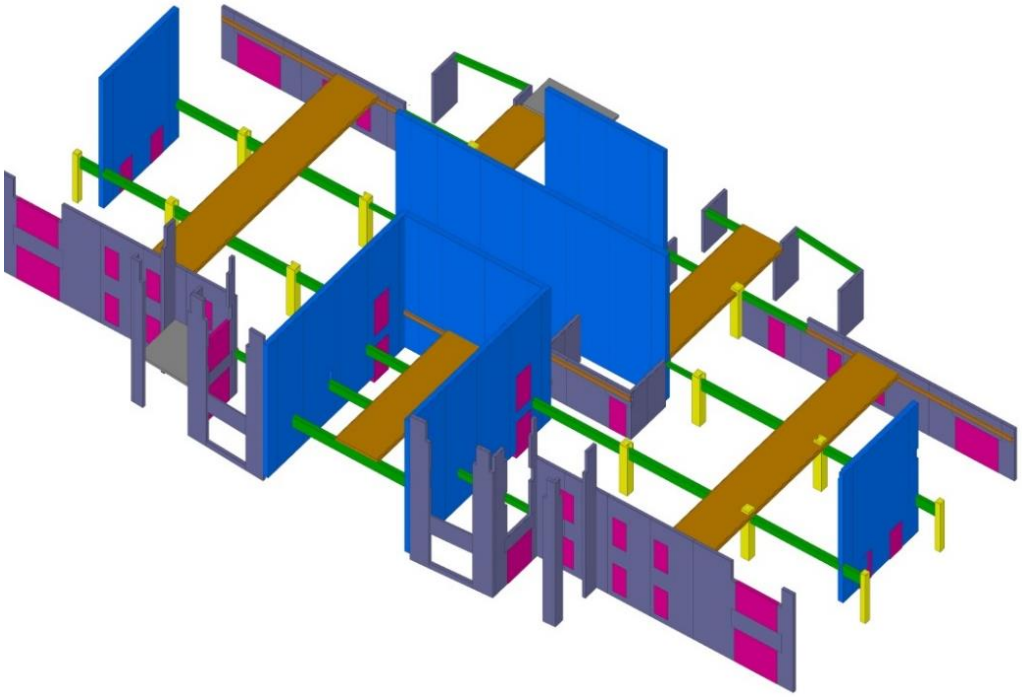

Figure 13: Structural system isometric view 1

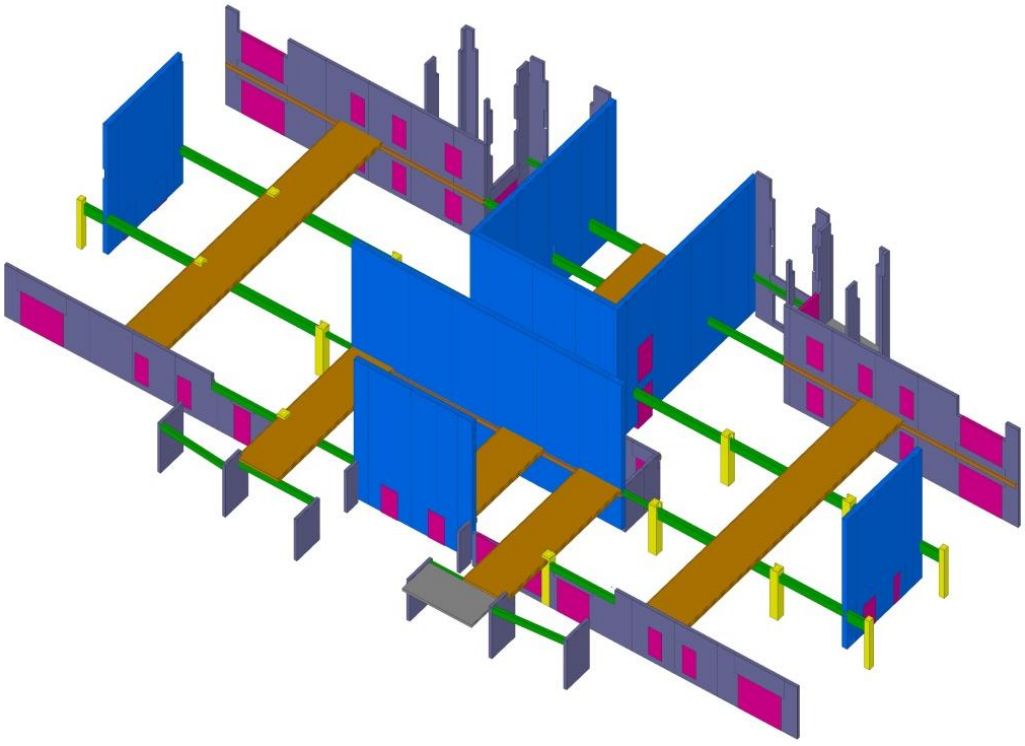

Figure 14: Structural system isometric view 2

3.5. Structural system (lateral)

The lateral loads are resisted with cross-laminated timber and glulam shear walls. The fact that Quebec City is an active seismic area and that the building is located on very poor soil made the lateral analysis and design the most challenging part of this project. Response spectrum analysis was carried out to determine the seismic forces while static and dynamic wind analysis led to the final wind forces.

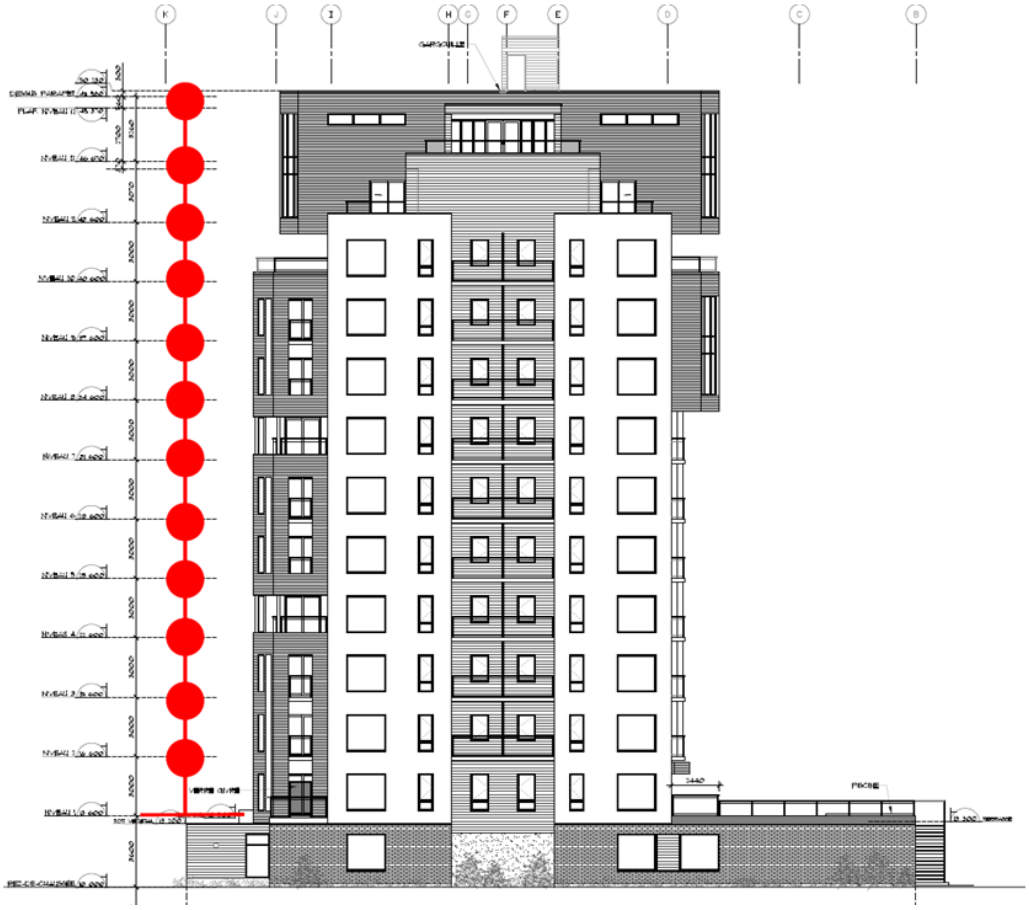

Figure 15: MDOF system for lateral analysis

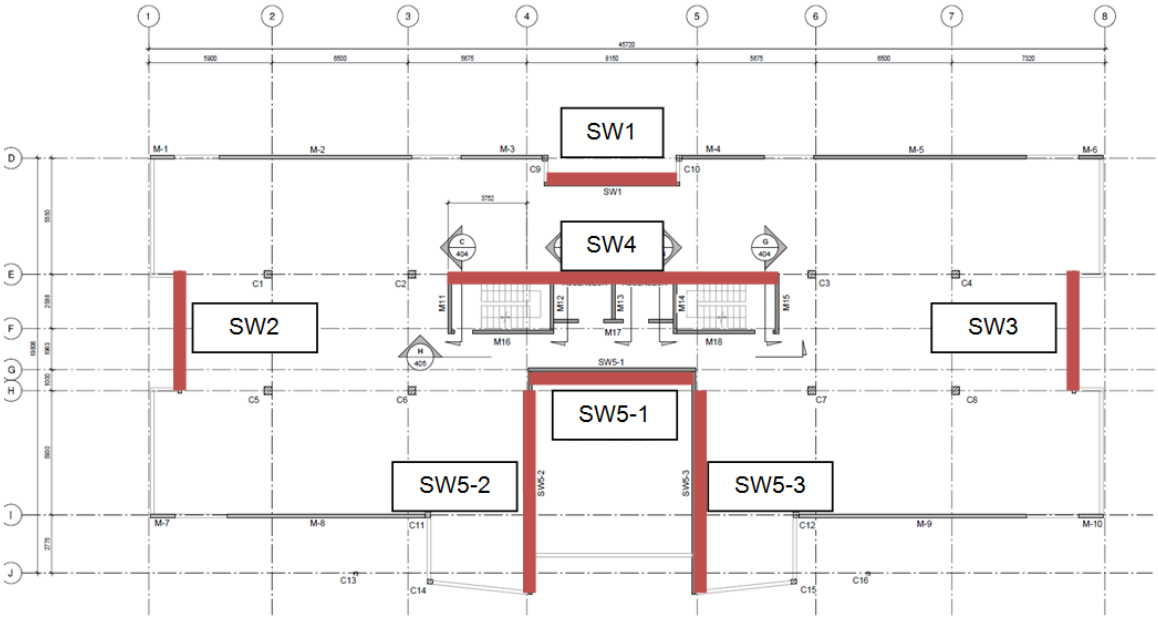

Figure 16: Plan view of lateral force resisting system (shear walls)

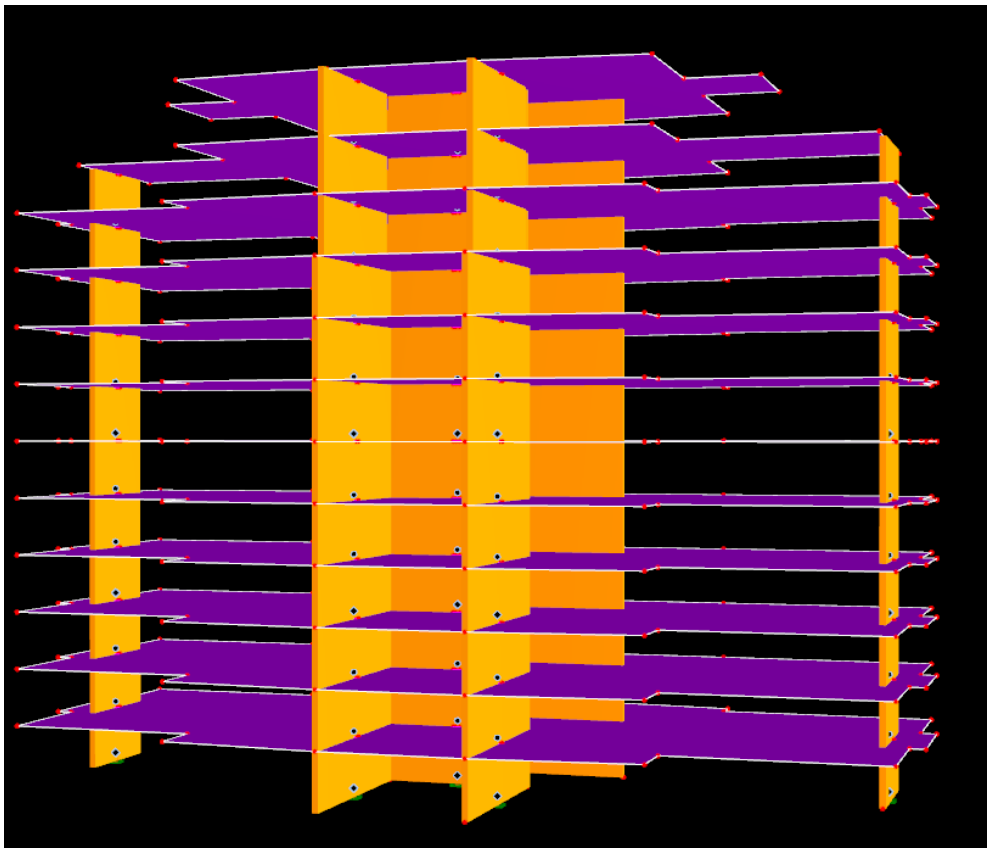

Figure 17: Snapshot of structural model in Dlubal RFEM

3.6. Installation

At the time of writing this article, the foundation was being prepared and the approximate time-frame to begin installing the wood structure was to be in the last weeks of November. It is estimated that it will take approximately 15 weeks to install the structure.

Figure 18: Foundation installation of Origine, Sept. 25, 2016